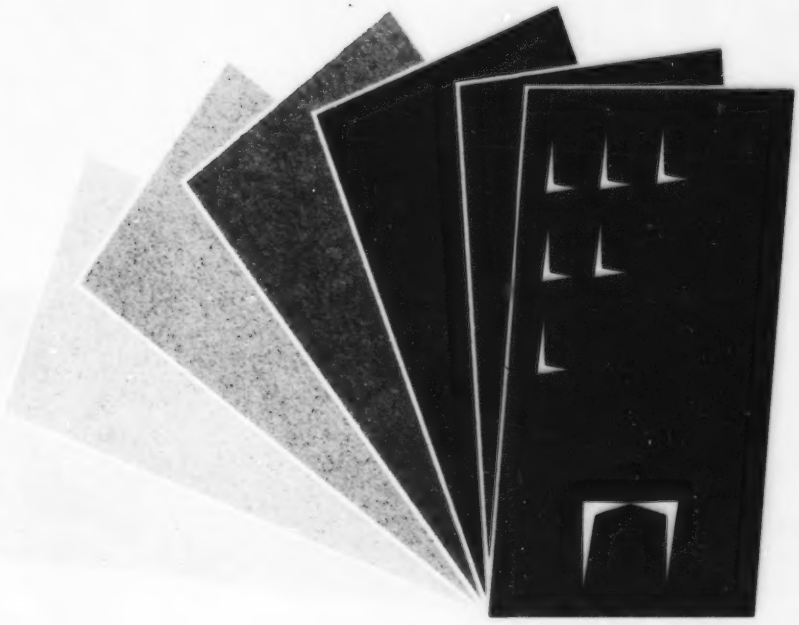
Educational Technology Planning: A Framework



DOC
BC
C47162
D:E38
2000
c.3

CENTRE FOR CURRICULUM, TRANSFER & TECHNOLOGY

May 1999

LEGISLATIVE LIBRARY
VICTORIA, BC V8V 1X4

LEGISLATIVE LIBRARY OF BRITISH COLUMBIA
3 3298 00236 1716

100-07598/

EDUCATIONAL TECHNOLOGY PLANNING: A FRAMEWORK

Randy Bruce

Dean, Information & Educational Technology
Kwantlen University College

With contributions from

Jim Bizzocchi

Senior Progam Manager
Centre for Curriculum, Transfer and Technology

Adrian Kershaw

Vice President, Community and Distributed Learning
University College of the Cariboo

Andrew Macauley

Dean, Information Technology and Learning Resources
Camosun College

Heather Schneider

Dean, Instruction and Education Technology
College of the Rockies

Canadian Cataloguing in Publication Data
Bruce, Randy.
Educational technology planning

ISBN 0-7718-9550-X
1. Educational technology – British Columbia – Planning. 2. Universities and colleges – British Columbia – Communication systems – Planning. I. Bizzocchi, Jim. II. Centre for Curriculum, Transfer and Technology. III. Title.

LB1028.3.B78 1999 371.33'73 C99-960194-6

© 1999
Centre for Curriculum, Transfer & Technology

This document is available at

http://www.ctt.bc.ca/edtech/framework.html

Educational Technology
Centre for Curriculum, Transfer and Technology
6th floor, 1483 Douglas Street
Victoria, B.C.
V8W 3K4

Phone: 250.413.4471
Fax: 250.413.4403
www.ctt.bc.ca/edtech

CUPE 2081

Printed on Recycled paper

Table of Contents

A. GOALS AND OVERVIEW OF THE PAPER Page 1

B. PLANNING SUMMARY Page 2

C. CONTEXT Page 5

1. Educational technology defined Page 5
2. Deciding where to apply educational technology Page 5
3. Using educational technology effectively Page 6
4. Three principles for planning educational technology Page 8
   a. Connecting the plan to institutional mission and vision Page 8
   b. Fitting the plan into an overall information technology strategy Page 9
   c. Harmonizing the plan with the institutional context and culture Page 11

D. ELEMENTS OF THE PLAN Page 12

1. Communications and advisory processes Page 12
2. Professional development and training Page 15
3. Technical and instructional support Page 16
4. Distributed learning services for students Page 17
5. Services at regional centres Page 17
6. Technology components Page 18
7. Policy considerations Page 22

E. THOUGHTS ON IMPLEMENTING THE PLAN Page 24

F. EDUCATIONAL TECHNOLOGY PLANNING RESOURCES Page 25

A. GOALS AND OVERVIEW OF THE PAPER

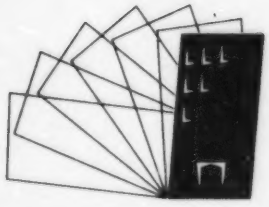
Educational technology has become an integral part of the teaching and learning processes at nearly all educational institutions: it can be used pervasively and can be used in ways that significantly change the status quo. Adequate planning will ensure that educational technology is deployed strategically and effectively. A good plan will help an institution to meet its goals and can act as a catalyst for change.

This paper has been prepared to assist planners at colleges and universities with the task of planning for educational technology. Many of the suggestions are generic and are applicable to planners in the public and private school system, as well as private training institutes. Faculty, students, administrators and support staff involved in educational technology planning initiatives at institutions will find this material provides an overview of the issues to be addressed in the planning processes.

The paper is presented in two parts. The first describes the context of the planning process, including the relationship between other institutional plans and the plan for educational technology. This section also outlines issues related to where and how educational technology may fit within the organization.

The second section identifies some of the elements that make up an educational technology plan. It highlights the challenges faced by institutions grappling with resource allocation questions, explores the critical role of communications with stakeholders in the planning process, and describes the support services and infrastructure needed.

Planning is an ongoing endeavour, and this paper can also be used as a touchstone during planning reviews and updates.



B. PLANNING SUMMARY

Educational technology is used to support a range of educational activities, including making learning resources available to students on an "any topic, anywhere, anytime" basis. Coupled with telecommunications, educational technology can support connections with educators and other students to provide a rich learning environment.

The educational technology plan is developed from the institution's existing education and information technology plans. When reviewing educational plans, consider that educational technology is only one of a number of means that can be used to assist an institution to meet its goals. Similarly, review the overall information technology strategy for the organization and determine how educational technology can be supported by that framework. Perhaps most importantly, consider how the use of educational technology fits with the institution's culture, values and history. It should consist of the following elements:

1. Communications and advisory processes:

Educational technology can be used to support fundamental institutional change and realignment: lack of communications can produce unnecessary fear and anxiety. Due to its potential application throughout the educational enterprise, the planning process should involve a wide range of participants, including the board, senior management, administration, faculty, support staff, students and other partners.

2. Professional development and training:

Employees will only be able to help the institution reach its goals using educational technology if they have had the opportunity to develop their own understanding and skills. This needs to be an ongoing institutional commitment as many aspects of educational technology are undergoing rapid change and development.

3. Technical and instructional support:

Many aspects of educational technology are in the early stages of development so faculty and students alike require adequate levels of support to help make their experiences successful. As educational technology applications are more widely adopted, support strategies for an increasing number of users also need to be developed.

4. Distributed learning and support for distributed learning students:

Educational technology can be used to support distributed learning ranging from providing to online learning resources that supplement face-to-face instruction to providing complete programs internationally through the use of the Internet. Institutions need to consider where they want to be positioned on this spectrum, and then to ensure that sufficient support for distributed learning students is provided.

5. Services at regional centres:

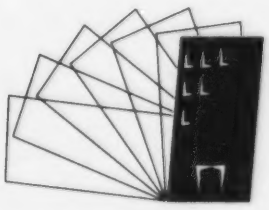
Expanded roles are possible at smaller regional centres due to the application of educational technology. Consideration needs to be given to the kinds of support services these centres can provide to students in their region.

6. Technology components:

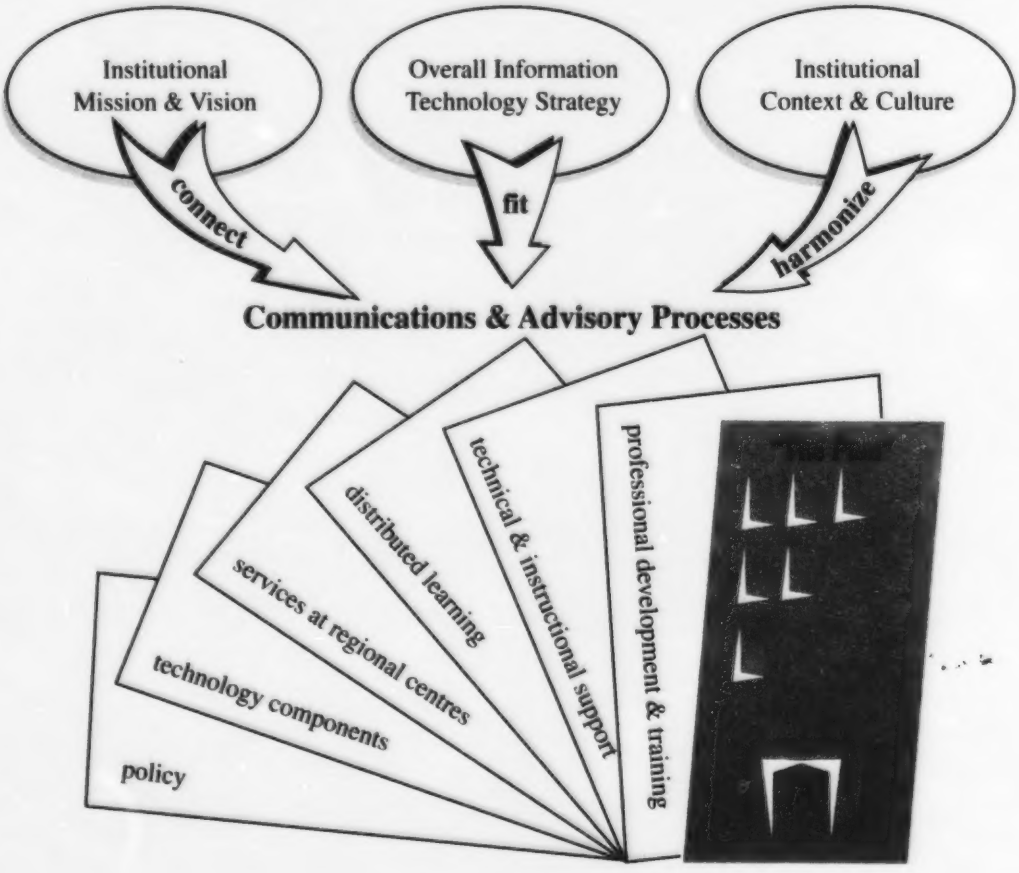
Considerable thought needs to be given to planning the acquisition, deployment, utilization, replacement and disposal of the educational technology components. Costs are considerable and ongoing, and identifying ongoing budget sources is a critical exercise in the planning process. There are many possibilities and parallels that can be made with other information technology components, and opportunities for joint collaboration.

7. Policy considerations:

The implementation of educational technology will inevitably lead to a number of policy challenges. Some of these may be resolved by reflecting on pre-technology situations, while others arise due to the technology itself. Areas to be considered include copyright and intellectual freedom, appropriate usage, resource provisioning and protection of privacy.



A Framework for Educational Technology Planning



C. CONTEXT

The conditions that prevail at an institution have a lot to do with the planning process. This section contains a working definition of educational technology that can be used as a starting point for institutional discussions. Thoughts on deciding where to apply educational technology and on using it effectively are also provided. Also included in this section are three principles for planning educational technology: connecting the plan to institutional mission and vision; fitting the plan into an overall information technology strategy; and harmonizing the plan with the institutional context and culture.

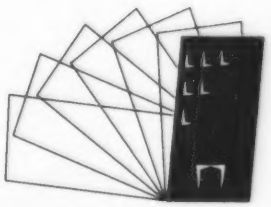
1. Educational technology defined

Educational technology can be defined as the use of computing, media and telecommunications technologies in the process of teaching and learning. The key phrase in this definition is "the process of teaching and learning". Everything in this endeavour is based on the educational processes that technology is meant to support. The goals are all human activities, not wires and boxes.

However, the technologies do affect what people can do. The convergence of these three technologies (computing, media and telecommunications) and their pervasive presence has had a powerful effect on all aspects of culture, society and economy. Instructors and learners can engage in many variations of traditional educational activities. Technologically assisted teaching and learning experiences can happen in classrooms, laboratories, libraries or individual workstations. They can take place on campus, at smaller campuses or learning centres; at partner institutions' campuses; and in homes and workplaces.

2. Deciding where to apply educational technology

Increasing outreach and access is a potential goal that lends itself to the application of educational technology. The outcome for this endeavour is to expand learning opportunities for distant learners (the placebound students) and for those with scheduling, work or family responsibilities which prevent them from attending regularly scheduled classes (the timebound students). Funding for this goal - both operating and capital - should be directed at those departments and programs with the strongest combination of market need and departmental readiness.



Another broad goal of the institution may be to develop a widespread base of educational technology capability across the institution. This initiative's outcome might be to increase the quality and effectiveness of campus-based teaching and learning. This could entail providing educational technology facilities such as classroom data projectors, multimedia production stations, Internet access and so on. A related outcome could be to increase employee competency in this area. These skills might range from the development of a broad institutional understanding about the principles of instructional design, development of an understanding of media/technology educational capabilities and applications and development of skills in the use of specific software packages. It should be possible, once the scope of the institution's goals in this area is established, to identify a baseline set of skills attainable by those who need to integrate educational technology into the teaching and learning process.

The boundary between on and off campus use of educational technology is a fuzzy one. As the application of educational technology increases on campus, it is likely this will increase the ability to deliver course segments or complete courses off campus. Hybrid (or mixed-mode) courses may be developed, with some elements being delivered in traditional face-to-face formats and other elements being delivered asynchronously, both on and off campus. There is potential for increased classroom utilization if scheduling systems can take advantage of this approach.

3. Using educational technology effectively

There are numerous examples in the educational system where educational technology has not been used effectively. Typically, this occurs where the technology is used to simply replicate existing classroom-based activity on the computer screen or through some other medium. Merely making lecture notes available over the Internet is unlikely to result in an effective online course. Clearly, there are appropriate and inappropriate uses of educational technology.

The best examples of appropriate use are found in educational practice which is grounded in the fundamentals of instructional design. Effective practice is dependent on an overall instructional design analysis to select the technology (or technologies) and exploit specific educational capabilities. This analysis must be based on a careful review of learning outcomes, learner characteristics, learning activities, content imperatives, learning environment, assessment strategy, available budget and institutional capabilities. Rather than shoehorning existing pedagogical practice into a new medium, the educational goals, pedagogical practice and technological capabilities need to be compatible and integrated.

By using a number of different approaches to instructional design and theories of learning, faculty are working through the implications of educational technology for the design and development of learning environments. Instructors are incrementally testing new approaches, and incorporating proven technologies into

teaching and learning contexts. Competency-based education, problem-based education, learning outcomes analysis and constructivist learning theory are but a few examples of approaches which can be enhanced by the appropriate incorporation of educational technology.

A number of effective educational characteristics have emerged from these approaches. Some examples include:

a. creation of authentic environments which anchor the learning in a context which is relevant to the student;

b. solution of real-world problems;

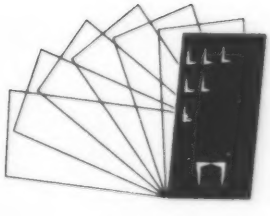
c. instructors acting as coaches and commentators on the problem-solving strategies developed by students acting individually or in groups;

d. focus on providing access to multiple representations or perspectives on the knowledge being developed or processed;

e. active involvement of students in negotiating their own learning goals;

f. the use of evaluation as a tool for self-analysis;

g. mediation and shared control of the learning process by the learner.



4. Three principles for planning educational technology

Three principles provide a key part of the planning context: that the educational technology plan needs to be driven by the institution's mission and vision; that the educational technology plan needs to be a part of the institution's overall information technology plan; and that there is a need for integration of educational technology planning with the institution's own context, culture and history. Each of these principles is more fully desribed below:

a. Connecting the plan to institutional mission and vision

Each institution needs to explore the relationship of technology use to the institution's vision and core mission before embarking on the extensive use of educational technology in teaching and learning (both on and off campus). The plan's focus will be on educational and service outcomes rather than on the technology. There must be a clear relationship between educational technology and the educational goals embodied in the institution's vision statement and mission. Without this connection, planning, budgeting and implementation strategies are unlikely to be useful to the institution's development.

Essentially, planners at each institution need to ask a number of questions, such as:

i. What are the goals related to the incorporation of educational technology into the teaching and learning process?

ii. Is there an understanding that the appropriate use of technology can both increase the effectiveness of the learning process for students and at the same time provide students with an enhanced exposure and familiarity with information technology applications?

iii. Will educational technology be used to increase access for placebound and timebound students?

iv. Is educational technology part of an effort to increase revenues by tapping into new markets?

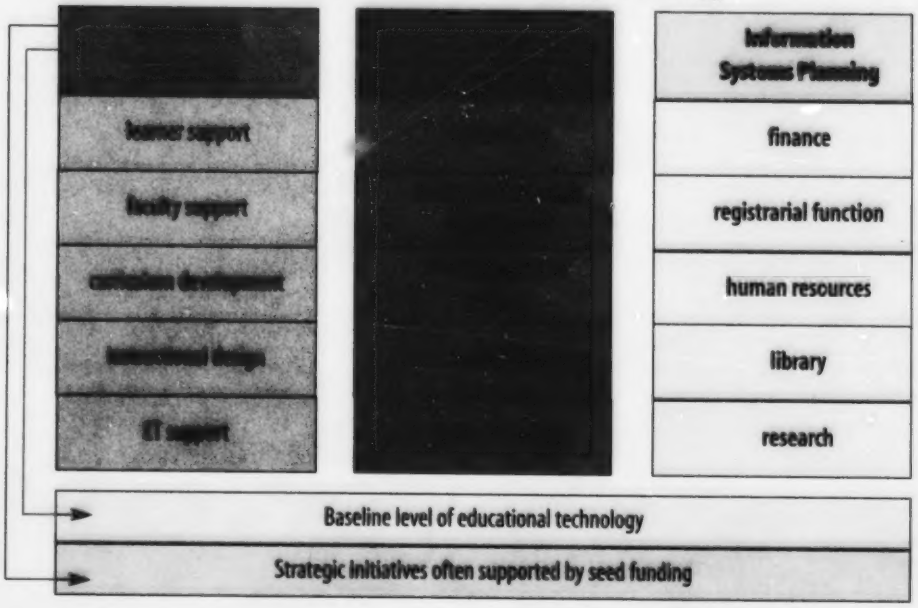
v. Can educational technology be used to further develop learners' technological literacy and team-based skills that enhance their economic, social and personal development, and also contribute to workplace needs?

In short, the rationale for the institution's involvement in the continued use of educational technology should be established early in the planning process.

b. Fitting the plan into an overall information technology strategy

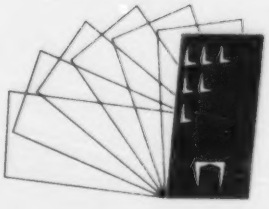
The educational technology planning process needs to be integrated into an overall information technology strategy for the institution. This will ensure alignment of goals and will minimize any duplication of effort. Often, planning processes for educational technology and administrative information systems are separated, which is likely to lead to inefficiencies or missed opportunities, and can result in duplication of both services and resources. The key components of the information technology strategy are shown below:

Information Technology Strategy



As the above suggests, the planning for infrastructure and support is designed to provide the network and technology infrastructure for both the educational technology plan and the information systems plan. There may be some blurring of support services: for example, an effective help desk for employees may or may not be appropriate to handle learner and faculty development support as well.

The first broad area of the educational technology plan comprises a basic level of service and support that is available to appropriate users. Institutions will provide different levels of basic service based upon budget, mission, vision and planned scope of educational technology implementation. Adopting a wait-and-see approach to this need for basic institution-wide support



will not be sufficient, and will almost certainly lead to additional cost, unplanned and uncoordinated activities, and confusion.

One decision faced by institutions is to determine the appropriate mix of generalized support for on campus educational technology development and the targeted support for specific off campus distributed learning courses and programs. Clearly, there needs to be a determination of the basic levels of service which the institution will provide. Explicit recognition of these core functions and activities will help in priority setting and budget development.

There are a host of new issues that educational technology implementation places on an institution. Some institutions have responded by building specialized educational technology units, others combine all the technology functions within a broader information technology division. Regardless of how they are structured within the organization chart, the information technology specialists and the educational technology specialists must work closely together. Between them, they must efficiently deal with the wide range of technical and operational issues that effective implementation requires.

In many institutions support for both computing and educational technology has traditionally been provided by specialized Information Technology (IT) units. With the explosion in computer use in almost all aspects of institutional operation this may require rethinking. IT groups are finding themselves overwhelmed by the growing volume and diversity of demands. Critics have dubbed this the "support service crisis" and it is often cited as the greatest challenge colleges face as they implement technology.

Once the overall levels of institutional support are known, individual departments and divisions could be encouraged to commence their own planning for the implementation of educational technology, or alternatively, this might be the role of an institution-wide educational committee. These plans need to identify how educational technology is to be used at the program and course level. They must include a realistic assessment of what can be attempted and supported given the institutional and unit resources available in areas including professional development, software training and support, peer support, workstation availability and desktop computing performance.

The second area of the educational technology plan is the development of a finite number of strategic initiatives. This will usually take the form of a few pilot projects. These pilot projects should be initiated with the institution's commitment to move them to full implementation providing they meet stated objectives. Too often pilot projects are started and then dropped because there is insufficient commitment to providing the resources to ensure full and sustainable implementation once they prove to be viable. If this is allowed to happen, large amounts of time, effort and money will be wasted, and cynicism will be engendered over the institution's commitment to the use of technology in

teaching and learning. Momentum will be lost, and it will be difficult to revive meaningful interest in these or other new initiatives. As part of the planning process for such strategic initiatives, the institution needs clarity on their nature and scope, and on the criteria by which they are to be selected. Most institutions will not have the financial or technical support resources to support many such initiatives. Therefore, care needs to be taken over establishing the linkage with the institution's vision, the market for the curriculum, the true costs and expected revenues.

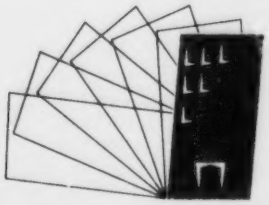
Once the scope and purpose of educational technology use has been determined, the development of the overall plan can begin. Note that this will start with the goals of the institution, division, department or unit followed by the planning for the technology and support needed to successfully realize those educational and support goals.

c. Harmonizing the plan with the institutional context and culture

The third principle is the need for integration of educational technology planning with the institution's own context, culture and history. The potential of educational technology can only be fully realized when people at the insitution are ready and able to use and harmonize the technology within their context. An institution that is debating the merits of putting computers on all employees' desks is not likely to go about planning for moving all course information and resources online as an institution that already has supported and encouraged all employees to develop Internet skills.

Institutions that have a history of successful distance education will likely focus on different aspects of the planning process than those that are determining if they even want to offer complete courses or programs in off-campus formats.

Planners can review and learn from other institutions' plans, but ultimately the plan developed must be a fit for their institution. That is why this document is entitled a framework and merely provides a checklist of issues to be considered. Development of an educational technology plan is a difficult process and will require dedication and commitment from the institution's members.



D. ELEMENTS OF THE PLAN

This section describes the various elements which could be included within an educational technology plan. It is important to note that each plan must be carefully tailored so that it matches the particular needs of the individual institution. It may include as much or as little information as is needed to guide the actions of the institution. Following are descriptions of some of the areas which should be considered in the educational technology plan.

1. Communications and advisory processes

A plan must be communicated and understood to be useful. Educational technology planning is relatively new in some institutions, and because it can be transformational, it is essential that considerable attention be given to how the plan is to be communicated. Perhaps more importantly, developing understanding and commitment of a wide range of stakeholders can be key undertakings in keeping the plan alive.

Each institution will need to consider an advisory process for educational technology implementation. Processes and structures vary and they need to be consistent with institutional history and culture.

There are several variables to examine when structuring an advisory process:

a. the size and representativeness of the contact or membership list;
b. the degree of formality and structure;
c. the nature of the topics to be reviewed; and,
d. the person or group to whom the advice is directed.

Most institutions will want to enable a wide range of involvement in an educational technology advisory process. Participants will certainly include those most interested in the process of using technology in education, but may also include those who are more neutral on this question. To ensure perceived legitimacy, there should be an openness to whatever process is used, either through informal self-enrollment or through more formal selection and delegation processes. Employees with generalized educational technology responsibilities (such as educational technology coordinators) should be closely involved in the advisory process.

Administrators directly responsible for educational technology implementation (deans, directors and managers of educational technology, and/or computing services) should have a clear relationship to or participatory role within the advisory process. Institutions may also wish to get some degree of student participation in an overall advisory process, or in those aspects of decision-making most important to particular constituencies (for example, staff skills development or student fee for service offerings).

Advisory processes will vary in degree of formality based on institutional patterns. All processes should provide a venue for free discussion of pedagogical and institutional implications of technologically-assisted educational processes. Professional development in educational technology for committee members should be ongoing. Perhaps members will be expected to lead some change initiatives with support. It should be clear to all involved what the status of the advice is, and to whom it is directed. The advisory process needs to include feedback on the results of the advice.

Related to the advisory process are the ongoing patterns of communications with respect to educational technology planning. Good communications with all constituents is a key component of an effective planning process. There is no 'right way' to do this. What works best will depend on a number of factors, including institutional culture, desired outcomes and leadership styles.

Educational technology can be pervasive and has the ability to be used in ways that significantly change the status quo. Significant changes are likely to be measured in years, so it is important to create an atmosphere that supports and fosters change.

Here are some communications guidelines that have worked for some institutions:

a. Board

   i. ensure Board members understand what the institution plans to accomplish through the use of educational technology and what the benefits will be;

   ii. consider developing a Board 'ends' policy concerning priorities for technology integration.

b. Institutional Committees

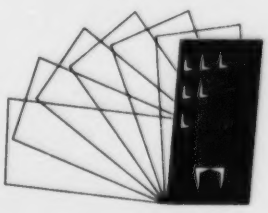
   i. institutional advisory groups, councils, curriculum, divisional and departmental committees should be considered as resources with expertise and interest in the enterprise, and can provide effective visioning and feedback.

c. Senior Management

   i. a member of the senior management team should be responsible for and closely connected to the educational technology planning process. Without this the process will tend to lack credibility, focus and commitment;

   ii. the planning process must be understood and supported by the entire senior management team;

   iii. focused presentations that encapsulate the 'big picture' delivered by a member of the senior management team may be useful. These should be shared widely.



d. Administration

i. communicate versions of the plan during development;

ii. solicit improvements and support from this group;

iii. ask them to communicate with their staff.

e. Faculty

i. use educational technology committees with substantial faculty involvement to develop, critique and revise the educational technology plan;

ii. ask committee members to describe the plan to other faculty;

iii. consider speaking with a small number of influential and knowledgeable faculty on a one-on-one basis: listen to their concerns and address these concerns in the plan;

iv. ask faculty to discuss related issues (e.g. access) with their students;

v. attend faculty meetings (discipline/chairs/coordinators) to discuss the plan and process.

f. Support Staff

i. obtain feedback from staff to ensure that communication is occurring;

ii. meet with staff on specific issues, perhaps include staff representatives on the planning team.

g. Students

i. discuss the plan with the Student Association;

ii. potentially use focus groups for input and encourage student participation.

h. Partners

i. discuss ideas with related organizations (schools, colleges and universities, private training institutions and others).

2. Professional development and training

Professional development and training are critical components of the educational technology plan, and the development of employee skills is one of the key elements.

Some skill development areas to consider are:

a. instructional design skills;

b. diversified instructional roles;

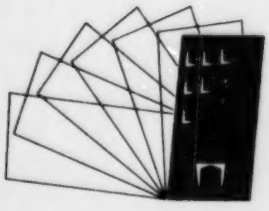
c. understanding of appropriate educational applications for various technologies; and,

d. specific hardware and software skills.

Development activities may be structured in several ways: formal workshops, learning packages, individual consultations, user groups and peer mentoring.

All levels of personnel may benefit from development of instructional team concepts that integrate development, instruction, technical support and educational support processes.

Training needs will be ongoing, so the plan should provide for training components linked with all significant planning initiatives.



3. Technical and instructional support

It is crucial that adequate technical support is available to employees, students and others involved in educational technology. Without this support, confusion and demoralization will occur quickly. Increasing the amount and complexity of educational technology requires allocating additional support to user support, technology maintenance and instructional development.

Institutions should consider providing the following support services:

a. ensure that users have completed a basic course in the technology they will use;

b. give adequate support to educational technology users;

c. provide an environment in which users can take risks with the technology;

d. accommodate appropriate experimentation;

e. provide dedicated technical support to educational technology (not off the side of someone's desk); and,

f. mentoring programs.

Institutions can alleviate some support challenges by freezing educational technology-based course development and implementation at a point in time after testing (and before the start of these courses) . Sometimes, well-intended feature additions can lead to unfortunate service-affecting problems.

Another tactic to consider is adopting and supporting single solutions such as one web-based course authoring tool, rather than diluting support services by attempting to acquire, install and maintain multiple tools and systems that perform similar functions.

As some components of educational technology mature, they tend to become more reliable and easier to use, so that ongoing support requirements diminish. However, two factors contribute to the ongoing need for support:

a. a growing number of users;

b. new developments that tend to require high levels of support before they become stable (driven by more sophisticated users).

4. Distributed learning services for students

There are a range of questions and implications of distributed learning capabilities that institutions and educators should consider. Insitutional strategy and policies for distributed learning form a key part of the wider institutional framework that the educational technology plan must support.

Some distributed learning issues will require explicit attention under the technical and instructional support sections of the institution's educational technology plan. Students may be taking courses from several institutions at the same time: in class from their local institution, and through distributed learning courses from local and/or distant institutions. There are a number of questions to consider:

a. What level of service should be provided to students who utilize distributed learning?

b. How will this service be provided: electronically, on the telephone, through the postal service, face-to-face?

c. Under what conditions will service be provided for other institution's remote learners?

d. What will the variables be for other institutions' learners: price, preferential access, limited access?

e. Should reciprocal arrangements with partner institutions be negotiated?

5. Services at regional centres

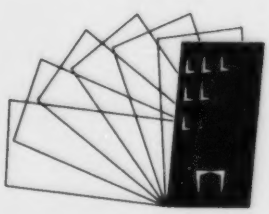
The role of educational technology at any regional campuses or centres of the institution should develop from the mission and vision of the institution. Over time, it may be useful to develop educational technology plans for each regional centre consistent with the institution's overall strategic plan and dovetailed with the broader institutional plan for educational technology.

Regional centre plans should include reference to:

a. the kinds of student support services provided at regional centres. Examples include:
   - library support
   - interlibrary loans
   - individual and group study spaces
   - peer group supports
   - counseling and advising services
   - on-line admissions and registration services
   - testing and assessment services

b. access to technology for those who cannot access it at home or at work;

c. funding for these services.



6. Technology components

One of the most significant challenges faced in the implementation of educational technology is the provision of adequate, up-to-date technology. Traditionally, computers and telecommunications systems have been treated as institutional assets and acquired through the operating capital process. However, due to the relatively short useful lifetime of much of this technology, it is more useful to think of these resources as ongoing expenses rather than assets. In the following list of considerations, most of the examples refer to desktop workstations but the principles apply equally to other components of the infrastructure, including telecommunication equipment, cabling, servers and presentation media equipment.

a. Plan for short equipment lifetimes:

Today's technology environment is one in which equipment is rendered obsolete almost as soon as it is acquired. Many analysts now consider the effective lifetime of most computer workstations to be less than eighteen months, though in educational institutions it is not uncommon to find units that are five or even ten years old. Technology plans must be developed which make provision for regular upgrades and the replacement of equipment. Educational technology should be thought of as ongoing operating expense rather than a capital asset. In that context, finding innovative and creative solutions regarding technology renewal should be a priority for all institutions.

b. Develop an understanding of the true costs:

Industry studies have shown that organizations seldom recognize the true cost of technology and consequently that they pay more than they should. The Gartner Group has developed Total Cost of Ownership (TCO), a metric which identifies the lifetime cost of workstations. In one study only 26% of the TCO of a workstation running Windows 95 was attributable to hardware and software. The remainder was due to the cost of technical support (17%), administration (14%) and end-user operations (43%). By surfacing these 'off the books' costs, TCO helps institutions to identify the hidden costs of technology, many of which can be minimized. Gartner Group analyses show that up to 26% of the Total Cost of Ownership for workstations can be eliminated through changes in corporate practices and the deployment of products and services which promote more efficient use of existing equipment, such as providing a standard software configuration. Similar savings can be made for other classes of equipment.

c. Ensure that technology meets user needs:

Fundamental to managing technology efficiently is having a strategy for ensuring that equipment meets the needs of the users. All too often money is wasted by paying a premium for equipment that exceeds the requirements of users, or productivity is reduced by trying to use equipment which is obsolete or not up to the job. To make allocation decisions it is important that institutions

clearly articulate the role of technology within the context of their strategic and educational plans, develop financial procedures which recognize the costs and contributions of technology, and develop a culture in which employees view technology as a tool to be used rather than a personal/departmental possession.

d. Consider standardization:

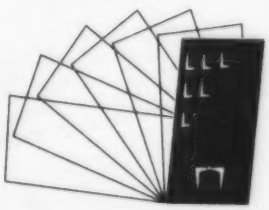
Hardware and software standards play an important role in any technology strategy. TCO calculations demonstrate that the majority of the real cost of ownership is due to support costs, many of which are aggravated by increased technological diversity. Training, maintenance, software distribution, user support, network communication and systems management are all more difficult, and as a consequence more costly, when dealing with a multiplicity of platforms and products. Many of the best practices for controlling costs identified by industry analysts depend upon having a reasonably homogeneous environment.

e. Pay attention to life cycles:

Frequently, inappropriate decisions are made due to an inadequate understanding of life cycle management of technology. All technologies go through periods when they are being introduced into the marketplace, when they are in widespread use, and when they are obsolete and being replaced. For workstations this cycle currently takes about 48 months. Studies have shown that the annual cost of ownership for equipment bought early in its life cycle is very high due to high purchase prices and shortages of software, supplies and expertise. Buying late in the life cycle reduces acquisition costs, but annual ownership costs still remain high due to upgrades and maintenance, the scarcity of expertise, and low or negligible resale values. In between there is a technological 'sweet spot' when supplies are plentiful, prices are low, expertise is available and affordable, and resale values are high. Appropriate strategies can dramatically reduce total cost of ownership (by as much as 25% for a typical workstation) by the acquiring and then disposing of equipment within this period.

f. Remember the infrastructure:

Often overlooked when planning for educational technology, are the ongoing costs of infrastructure upgrading. Frequently telecommunications and presentation equipment are thought of as a utilities, yet they must be renewed regularly to respond to changing demands. Unlike water, air conditioning and electricity, the wiring and cabling infrastructure in many educational buildings is not capable of delivering digital data at adequate rates. Networks that were sufficient for basic e-mail only a few years ago are no longer able to



satisfy the demands for video, sound and graphically-intensive images typical of today's rich electronic environment. As with workstations, the cost of the infrastructure must be considered as an ongoing operating expense rather than capital expenditure. Provision must be made to regularly renew all infrastructure on a three to ten-year replacement cycle. Due to increasing complexity, the cost of supporting the "stuff behind the walls", which already represents a significant hidden expense, will become a major component of TCO.

g. Turn equipment over on a regular basis:

The key to managing life cycles is turning equipment over on a regular basis. This is especially difficult for users who have come to think of technology as an asset to be owned rather than a tool to be used. One approach to changing this mind-set is to use leases to convert equipment acquisition from a capital cost to an ongoing operating expense. Leasing through a third-party involves some additional financial costs and ownership remains with the leaseholder, but it also offers a stable environment in which users can be assured that they will always have access to suitable equipment. This 'evergreen' strategy also provides inflation protection, simplifies administration and budget allocation, and shares risk with the leaseholder. Several financial management companies bundle their leases with other services which might be of interest to institutions such as maintenance, inventory control, software management, regular upgrade and brokerage/reclamation services.

One of the principal advantages of leasing is that it often frees up badly needed capital funds. While this may be attractive for commercial enterprises, it is likely not the case for most public educational institutions for which both capital and operating funds are limited. Some colleges may have the opportunity to open up new revenue streams which can be used to finance part or all of their inventory. When combined with leasing this can provide institutions with more flexibility than would be available with traditional acquisition strategies. For example, if some computer labs are used for self-funded activities, then the budgets for these projects can incorporate a user charge which makes the payments on leases. Some institutions have created student "technology fees" which fund support services and make a contribution to equipment replacement.

h. Be wary of donations:

Donations can be problematic. Often these gifts provide hardware and software, but they make no provision for equipment replacement or many of the other associated costs. By examining total cost of ownership, it becomes apparent that donations (usually given with the best of intent) often become long-term liabilities. An alternative for fundraising is to solicit funds for endowments that pay some portion of the cost of technology in perpetuity. Both donors and institutions may find it more attractive to build an endowment fund that keeps technology current rather than acquiring labs which become obsolete within a few years.

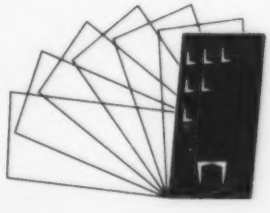
i. Consider student-provided computers:

Another option for sharing costs is to require that students provide their own hardware. There are sound pedagogical reasons for taking this approach, and it has the added benefit of reducing the need for the institution to maintain a large equipment inventory, thereby potentially saving costs in the long term. Some colleges simply publish standard specifications that students are expected to meet. Increasingly, institutions are setting up 'universal access' programs in which all students are issued a standard, pre-configured notebook computer. Typically this is funded through increased tuition or additional fees. Often these programs are managed through a partnership with a third-party vendor and a financial agency.

However, consider that notebook computers are substantially more expensive than desktop units and are rarely expandable. Additionally, there are significant institutional expenses required to provide the connectivity and power for student-provided units. Increasingly, many students already have their own computers before enrolling, so the prospect of asking them to buy a separate computer must be taken into account.

This approach is probably best considered only if the institution and program area are fully committed to this approach, and willing to adequately fund it.

Ultimately the cost of technology will need to be recognized by governments and funding agencies if distributed learning is to be implemented successfully. It is incumbent upon the institutions to work together to ensure that all stakeholders are truly aware of both the costs and the benefits of these new forms of education. However in addition to this advocacy it will also be necessary for them to do everything possible to efficiently manage the resources already at their disposal. There is no magic bullet: each institution will have to select the mix of strategies (only a few of which are given above) that will best address their specific situation.



7. Policy considerations

Institutional use of educational technology is often breaking new ground. There are a range of policy questions issues that will arise during the planning process. Some areas for policy consideration include:

a. Copyright and intellectual property:

It is important to be cognizant of copyright and intellectual freedom laws and regulations when introducing educational technology. Being prepared and researching this issue in the beginning will help ensure smooth implementation of initiatives. It is likely that the library and media departments will have considered many of these questions already, so they should be consulted. Local, national and global associations may also have helpful information.

Some examples of the types of issues and questions to be considered in a variety of situations include:

- when introducing new or different delivery methods: Can a video routinely played in a standalone classroom setting be shown when the class is conducted through interactive television? Do the graphic images contained in an online course belong to the institution or the staff member who created it?
- when purchasing or selling an institution's products and services: Has copyright clearance been obtained on the journal articles contained in the curriculum the institution developed before this curriculum is marketed and sold to other institutions?
- when involving students as participants: Are disclaimer forms required for students participating in interactive television courses?

b. Technology resource acquisition, allocation and renewal:

Section 6 described technology elements to be considered during the planning process. It may be useful to incorporate decisions and directions in this regard into policy. Guidelines on equipment and software standards can also be developed. By putting these decisions into policy, the institution makes decisions on priorities and commits to providing a level of technology that operating units can then assume will be available. They can then focus attention on how to utilize the technology to support the teaching and learning process.

c. Usage guidelines:

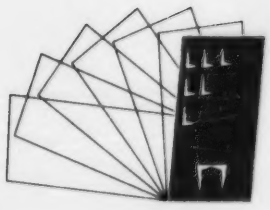
Guidelines on what constitues appropriate use should be developed and widely communicated. Many institutions have developed such policies, yet the continual expansion of the Internet routinely brings up new challenges that need consistent responses. When considering the development of policy in this

area, it may be useful to analyze the situation in a non-computing context for consistency. For example, if an institution is considering a policy restricting the use of Internet stations to course-related research only, it needs to ask if such a direction would be consistent with access to other learning resources (ie. are students restricted to using library books for course-related purposes only?)—in such a case, if the real concern is the availability of sufficient networked computing resources, limiting the time a student may use the computer would be more appropriate.

d. Related and overriding policies:

Human Rights legislation needs to be considered as well, as it overrides any institutional policy. Policies on freedom of information and protection of privacy need to be adhered to. Consider privacy issues pertaining to the record formed by stdents participating in online discussions.

Implementing new technology is a big challenge for the institution and staff involved. It is important that answers to questions such as these be developed before full scale operations begin.



E. THOUGHTS ON IMPLEMENTING THE PLAN

Educational technology is an everchanging, developing and expanding field. The document or plan that any institution creates must reflect a changing environment and so it should be a living document. The following action plan components could be included as part of any institution's implementation plan:

a. Specific action recommendations for the institution as a result of the consultation and development processes during the creation of the institutional plan. Such recommendations could include these items: forming educational technology committee(s), completing further reports (i.e. hardware and software standards); implementing new technology solutions; specific networking plans; and/or funding recommendation to sponsor educational technology. Each recommendation, together with completion timelines, should be assigned to the person(s) responsible for implementing the recommendation. Ensure the plan will be effectively communicated internally and externally. And, finally, the plan should be referenced in future decision making across the institution.

b. A process for regular review and updating of the plan (e.g. annually). Identify the person responsible for this ongoing development.

Finally: don't be paralyzed by a quest for perfection. At the risk of taking advice from a shoe manufacturer: ***Just Do It!*** Implement the plan, see what works and what doesn't and continue to make improvements in the next planning iteration.

F. Educational Technology Planning Resources

British Columbia. Ministry of Education, Skills and Training. *Charting a new course: a strategic plan for the future of British Columbia's college, institute and agency system*. 20 November 1996. Ministry of Advanced Education, Training and Technology. 1 June 1999. <http://www.aett.gov.bc.ca/strategic/newcourse/toc.htm>

Dearing, Stephen (Chairman). Higher Education in the Learning Society. [1997] National Committee of Inquiry into Higher Education. 1 June 1999. <http://www.ncl.ac.uk/ncihe/index.htm>

Dolence, Michael G. and Donald M. Norris. *Transforming Higher Education: A Vision for Learning in the 21st Century*. [Ann Arbor, Michigan], Society for College and University Planning, 1995. (Abstract available: <http://www.scup.org/> 1 June 1999).

Downes, Stephen. *The Future of Online Learning*. October 1998. University of Alberta. 1 June 1999. <http://www.atl.ualberta.ca/downes/future/home.html>

Green, K.C. *The 1998 Campus Computing Survey*. December 1998. Campus Computing Project. 1 June 1999. <http://www.campuscomputing.net>

Leach, Karen and David Smallen. *What Do IT Support Services Really Cost?* CAUSE/EFFECT, 21(2), (1998) 38-45. 1 June 1999. <http://www.educause.edu/ir/library/html/cem9829.html>

Matthews, Dewayne. "Transforming Higher Education Implications for State Higher Education Finance Policy." *Educom Review*, 33(5), (1998), 48-57. Educause. 1 June 1999. <http://www.educause.edu/ir/library/html/erm9854.html>